



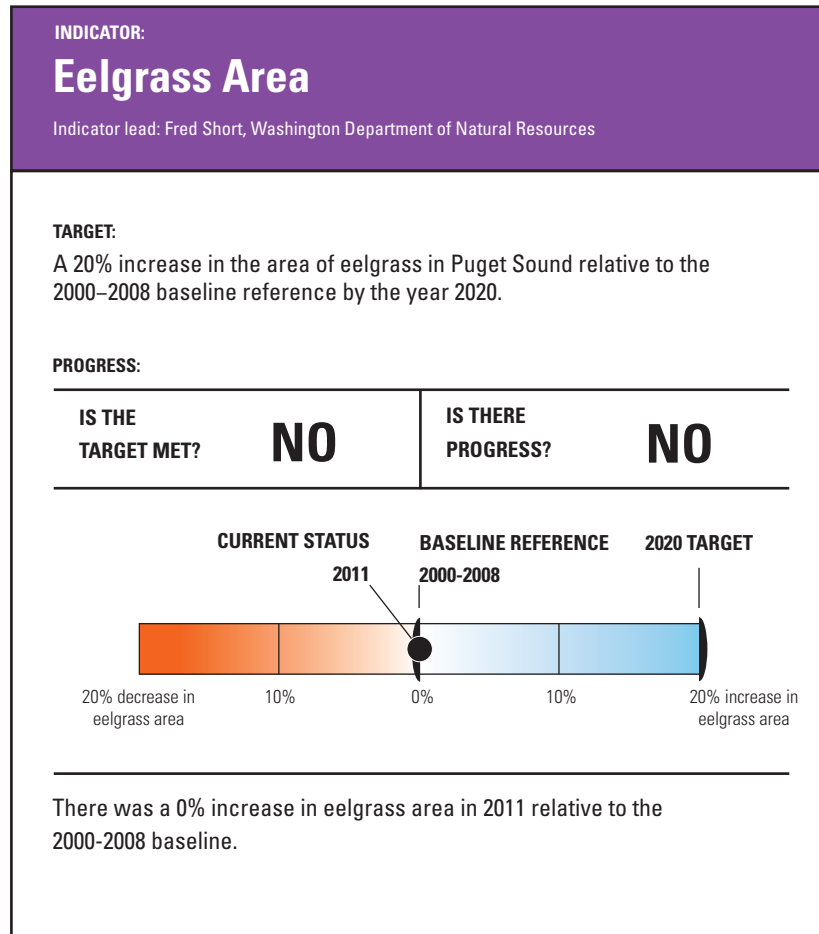
Eelgrass

Eelgrass grows in dense beds in the shallow waters of Puget Sound. This important marine plant serves as food source, nursery, and haven for birds, fish, crabs, shellfish, and other marine organisms. Eelgrass also filters sediments and nutrients, improving water clarity, and stabilizes the sea floor, which protects shorelines from erosion.

Eelgrass is valuable to the health of Puget Sound not only for the ecosystem functions it provides, but because it is sensitive to environmental stressors. Eelgrass health is an indicator of changing conditions in our watersheds and estuaries.

Although some larger Puget Sound eelgrass beds are stable, many of the smaller, fringing beds throughout the Sound are in decline. The reasons for this decline are not fully understood, but nitrogen pollution entering Puget Sound from human sources is likely having major impacts in many locations, while in other areas increases in sediment inputs and direct physical damage are stressing eelgrass beds.

Eelgrass



Progress Towards the Target

The Sound-wide area of eelgrass measured in 2011 has not changed relative to the 2000–2008 baseline reference, and thus there has been no progress towards the eelgrass 2020 target. The overall finding is that the majority of sampling sites across the Sound show no gains in eelgrass area. Furthermore, sites with decreasing trends in eelgrass area greatly outnumber those with increases, a concern for the health of eelgrass beds around the Sound.

Monitoring information indicates that the goal to achieve a 20% increase in eelgrass area by 2020 cannot be met with current management practices: the stresses on eelgrass in Puget Sound must be significantly reduced to see gains in eelgrass area and health.

What Is This Indicator?

Eelgrass (*zostera marina*) is an important submerged marine plant growing throughout Puget Sound. Changes in the abundance or distribution of this resource reflect changes in environmental conditions.

Eelgrass and other seagrass species are used as indicators of ecosystem health throughout the world because they respond sensitively to many natural and human-caused environmental factors that affect water quality and shoreline conditions. These factors are also likely to affect many other species that depend on eelgrass habitat.

For example, excess nutrients, sewage, and algae can reduce water clarity, while storms, runoff, and dredging can stir up sediment, preventing light from penetrating the water and reaching the eelgrass. Boat wakes, propellers, and docks can also disturb eelgrass beds.

Also, since eelgrass is protected by many regulations, its condition reflects, in part, the success of management actions. The Washington Department of Natural Resources assesses status and trends in eelgrass by evaluating eelgrass area and depth range at over 100 sites throughout Puget Sound annually, using a statistical sampling framework.

Two measures are used to demonstrate eelgrass status and trends in Puget Sound:

1. Sound-wide eelgrass area. The total area of eelgrass beds in Puget Sound.
2. Number of increasing, decreasing, or stable eelgrass beds. Count of eelgrass gains and losses on a site basis.

Interpretation of Data

Measure 1: Sound-wide eelgrass area

Puget Sound supports roughly 22,600 hectares of eelgrass beds (Figure 1). Eelgrass distribution patterns vary by sub-basin, with two main types of eelgrass beds: narrow fringing beds and broad beds on shallow flats. Approximately 25% of the total eelgrass area occurs in only two embayments: Padilla and Samish Bays.

There was no significant increasing or decreasing trend in eelgrass area in 2011 relative to the 2000-2008 baseline, calculated as the weighted mean of eelgrass area in that time period (Figure 1).

Measure 2: Count of eelgrass gains and losses on a site-by-site basis

A total of 211 sites are classified for eelgrass area trends. The majority of these sites are eelgrass beds where no change or trend in the size of the bed have been detected (170 sites; Figure 2).

Acres of Eelgrass in Puget Sound

in thousands, 2000-2008 baseline and 2009-2011 annual data

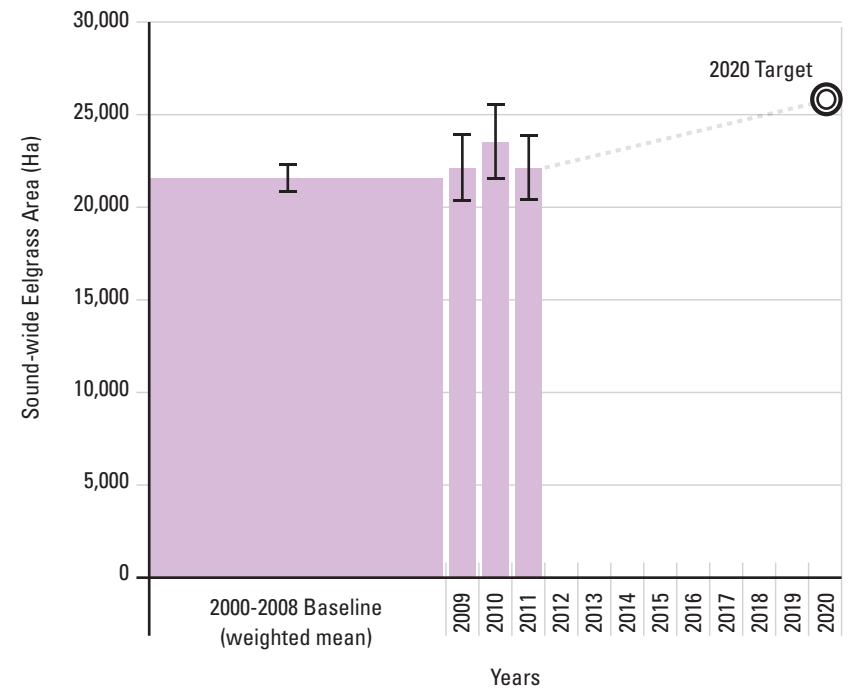


Figure 1. The annual estimates of Sound-wide eelgrass area for 2009-2011 compared to the baseline established by the Partnership's 2020 target for eelgrass recovery. Mean \pm standard error are shown.

Source: Washington Department of Natural Resources, Submerged Vegetation Monitoring Program

However, there are more than twice as many sites where the size of the eelgrass beds decreased than sites that increased. Of all sites analyzed, there were five cases of total eelgrass loss. In no region have improving eelgrass sites outnumbered declining eelgrass sites.

Eelgrass

Concerns about Hood Canal

Among the five eelgrass monitoring regions of Puget Sound, Hood Canal has the greatest number of sites where the amount of eelgrass decreased (Figure 3), including two sites where eelgrass beds completely disappeared. The Hood Canal region is a major concern particularly because 83% of changing sites are in decline. Another region of concern is the Saratoga-Whidbey Basin where 71% of changing sites are in decline.

The eelgrass in Hood Canal has been indicating signs of eutrophication: excess nitrogen loading from human sources contributes to the formation of seaweed blooms in the nearshore, which accumulate and grow in eelgrass beds, stressing the plants and contributing to the observed decline.

Although not related to human nitrogen loading and its impacts to eelgrass, stratification and low dissolved oxygen have been seen in this deep fjord-like basin. The localized eutrophic conditions in Hood Canal are evident throughout Puget Sound and pose a major threat to eelgrass and its health throughout the Sound.

Status of eelgrass sites in Puget Sound

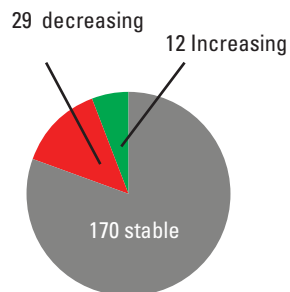
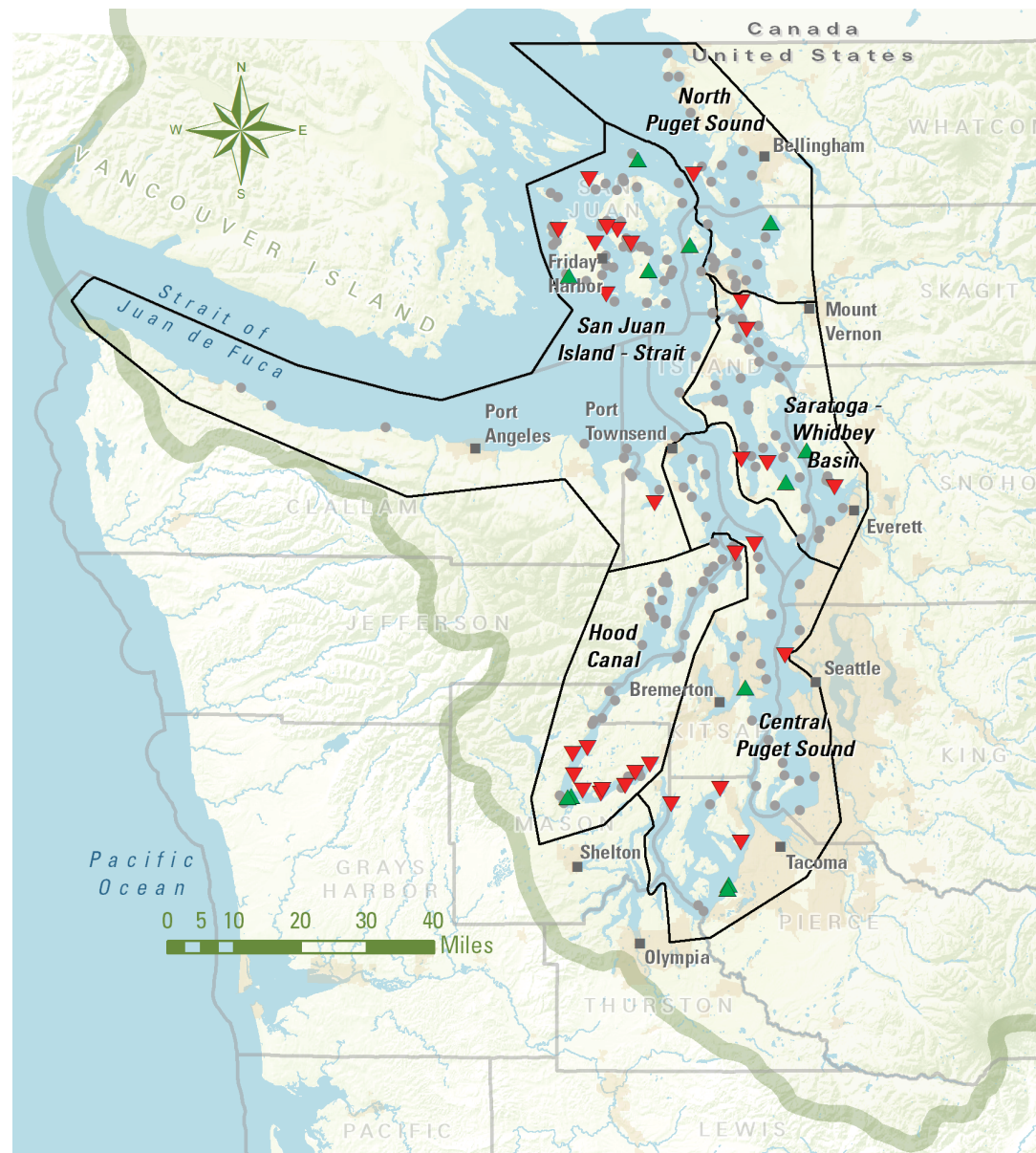


Figure 2. Number of sites in Puget Sound where the size of eelgrass beds increased, decreased, or remained stable since 2000.

Source: Washington Department of Natural Resources, Submerged Vegetation Monitoring Program

Figure 3. Distribution of eelgrass monitoring sites and their status.

Source: Washington Department of Natural Resources, Submerged Vegetation Monitoring Program



Eelgrass Monitoring Sites

- | | |
|-----------------------|---------------------------------|
| ▲ Increasing eelgrass | □ Eelgrass monitoring regions |
| ● Stable eelgrass | ■ Cities and urban growth areas |
| ▼ Decreasing eelgrass | ⬡ County border |
| | 🌿 Salish Sea Basin boundary |

Beach Watchers Keep an Eye on the Eelgrass

Washington State University Extension Island County Beach Watchers – Eelgrass Monitoring Project

Lush, subtidal beds of eelgrass provide habitat where snails and fish lay eggs, larvae thrive, crabs and forage fish reside, and young salmon seek shelter. Eelgrass dampens the impact of waves and resists the pressures of erosion. Knowledge about eelgrass in Island County is fueled by the Washington State University (WSU) Extension Island County Beach Watchers' Eelgrass Monitoring Project, which was born from a combination of university vision, knowledgeable and resourceful volunteers, a compelling question, and collaboration.

In the late 1980s, WSU Extension launched Beach Watchers to provide education, outreach, research, and stewardship for the marine environment in Puget Sound and the Salish Sea. Since its inception, the program in Island County has trained more than 400 volunteers, and each year it records more than 15,000 volunteer hours and monitors 30

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1000 hours to collecting
eelgrass data.*

Three WSU Island County Beach Watchers monitor eelgrass density and plant size in Holmes Harbor. Phot Credit: WSU Island County Beach Watchers

beaches. In 2002, Beach Watchers turned attention to eelgrass in a membership survey. Information and educational materials about eelgrass continued. The combination of increased eelgrass awareness, knowledge of the marine environment, and skillful observation fostered an important observation in 2007 when a Beach Watcher noted some eelgrass beds at Holmes Harbor had disappeared. The idea for the Eelgrass Monitoring Project soon followed. With funding from the Island County Marine Resource Committee, advice and assistance from the University of Washington Friday Harbor Labs and Washington State Department of Natural Resources (DNR), and a pilot study in

2008, the Eelgrass Monitoring Project was up and running at full-scale in 2009.

The Eelgrass Monitoring Project is conducted annually and includes three components: 1) a boat survey using underwater videography to document presence and absence of eelgrass along DNR-specified transects perpendicular to the shoreline at ten sites, 2) aerial photography during summer low tides to provide a broader look at eelgrass extent over a larger area, and 3) a boots-in-the-muck survey to count eelgrass leaves, measure plant density and water temperature, and gather vegetation samples in Holmes



Beach Watchers keeping an eye on the eelgrass

Harbor. Since program inception, more than 50 volunteers have contributed more than 1000 hours to collecting eelgrass data.

Surveys in 2009 and 2010 confirmed extensive eelgrass beds in Cornet Bay and Holmes Harbor. Damage to eelgrass beds was documented in Cornet Bay with the patterns suggesting possible damage from boating activities. Penn Cove surveys showed relatively few eelgrass beds with an unusual number of green sea urchins. Three years of study in Holmes Harbor point to eelgrass return and relatively stable beds since 2007 and suggest an unusual 2006-2007 winter storm from the north that coincided with an extreme low tide may have influenced the 2007 losses. Data from the eelgrass monitoring project are provided to DNR and are available on the Island County Marine Resource Committee's Sound IQ data system (www.iqmap.org/icSound-IQ/). These data on eelgrass, combined with other data on birds and mammals, intertidal habitats, fish distribution, and more are contributing to the overall understanding of the nearshore ecosystem around Whidbey Island.



WSU Extension Island County Beach Watchers

2010 - 2011 Eelgrass Surveys

Estimated Bed Area (Acres)

